A CLINICAL AND PATHOLOGICAL STUDY OF TWO CASES OF SPLENIC ANÆMIA, WITH EARLY AND LATE STAGES OF CIRRHOSIS.

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INTRODUCTION.

There is a growing belief in the existence of a disease described under many names—always a sign of ignorance—but at the present time called splenic anæmia more frequently than by any of the other synonyms. The term has been loosely applied, and, in fact, invites loose application, unless one has some acquaintance with the literature of splenic diseases and remembers "the good rule laid down by Socrates," as quoted by Osler. With that precaution, we think with Osler and Senator that splenic anæmia is a better word for the purpose than any other yet suggested. Since Banti showed the evolution of certain cases with enlarged spleen and anæmia into later stages with ascites and cirrhosis of the liver, his name has been used by some as a synonym, and, although Osler's suggestion that it be applied only to the later stages will doubtless have many followers, it will often be difficult to draw a line; for, though Banti thought he had discovered a disease distinct from splenic anæmia, he was aware of the difficulty of making a final conclusion. Even in the more recent literature, under the names splenic anæmia and Banti's disease, we find, besides some obviously faulty diagnoses, certain cases that differ from the generally accepted picture in some details. Senator, in adding greatly to our knowledge, showed that the symptomatology of the blood is not as Banti described it. Since not only this, but also many other allied topics in splenic pathology are only beginning to receive investigation, it is necessary to enlarge the casuistry and to collect and report as many cases as possible in which the clinical and anatomical features have been carefully studied. Banti's suggestion of extirpation of the spleen has already been of great benefit, not only as a therapeutic measure, but by increasing our knowledge of the changes in different stages, and should be followed in well-selected cases.

In the following we report two cases bearing upon the subject. One of these seems a good example of splenic anæmia in a comparatively early period. Clinically it is a good example of splenic anæmia in the old sense, but anatomically it shows changes in the liver that indicate the occurrence of cirrhosis of the liver had the condition gone on longer. The other has many of the features of Banti's late stage, but is complicated by an old and obscure peritonitis. Since this does not seem to have causal relations with the important changes in the liver and spleen, we report the case on account of the other changes. We do not intend to consider now the literature of the subject, reserving that for another time.

PART I. CLINICAL (DR. DOCK).

CASE I. *Splenomegaly, anæmia; removal of spleen; death. Fibrosis of spleen; beginning fibrosis of liver; stenosis and calcification of the portal vein; hyperplasia of hæmolymph nodes; new formation of lymphoid tissue.*—I. T. A., aged forty-one years, was admitted to the University Hospital as an out-patient July 27, 1899.

Family History. Father died at seventy-two years, having had a cough for twenty years. Mother died at seventy-eight years, of pneumonia. Patient had six sisters and three brothers; two brothers and two sisters are alive. Two sisters died of consumption, one in childbirth, one of "stomach disease." One brother died of "brain disease." Patient has one daughter, aged ten years, in good health. (Though a strong and robust girl, she had extensive pharyngeal adenoids, besides enlarged tonsils, and some months after this underwent operation for appendicitis, when the lymphoid tissue of the appendix was found to show a marked hyperplasia without other signs of appendicitis.) The patient's wife died one year ago, of leukæmia. (She was treated as an in-patient and out-patient of the Medical Clinic for a year and a half, during which time the husband showed a great interest in splenic disease, bringing to the hospital several patients supposed to have enlarged spleens.)

Habits and Occupations. Patient lived on a farm in his youth; since the age of twenty-one years has been in mercantile business. Has worked hard and at long hours, but has not suffered from that, and has not been unusually exposed. Meals have been regular; food good. Appetite has always been good, but bowels irregular. Has used little tea and coffee for ten years; alcohol rarely; tobacco not at all.

Previous Diseases. Had the usual diseases of children; had a severe fever, probably typhoid, seventeen years ago, and a mild attack of influenza a few years ago. Had always been subject to sick headache, but in 1901 had rectal "polyps and ulcers" operated (by a notorious "orificial surgeon"), and headaches have been less severe since then. Most careful inquiry could elicit no history of venereal disease.

Present Disease. About a week ago first noticed a soreness in the left hypochondrium and uneasiness in the abdomen, and on feeling discovered a tumor in the left side. He had noticed a gradual enlargement of the abdomen for a year, but thought nothing of it.

Status præsens, July 27, 1899 (Dr. Arneill). Frame of medium size, rather slender; muscles small and soft; panniculus thin; weight, 126 pounds, the usual weight in summer. The bones and joints are normal;

the inguinal glands can be felt; the other superficial lymphatic glands are not enlarged.

The gait is normal, appearance somewhat cachectic, expression depressed, mind clear.

The skin is somewhat pale and sallow, the visible mucous membranes of fair color.

The teeth are artificial; the tongue is of medium size; has a thin, white, moist coat.

The thorax is of good size and shape; expansion moderate; percussion and auscultation of lungs negative.

The apex-beat is in the fourth interspace, one inch inside the nipple line; the dulness is not enlarged; the sounds normal; no murmurs.

The abdomen is an inch above the level of the ribs, larger in the left side. The liver dulness extends from the sixth interspace to the edge of the ribs; the thin edge can be felt an inch below the ribs in deep inspiration. The splenic dulness begins on the seventh rib, in the mid-axillary line; extends through Traube's space to the navel line in the left nipple line, and two inches below the navel in the middle line. On palpation a hard mass can be felt in this region, having a sharp angle two and a half inches below the navel. A sharp edge runs up one inch to the right of the navel, and shows a notch an inch above the navel.

The radial artery is somewhat tortuous, the pulse easily compressed, moderately full, tension medium, rate 90, regular. The veins of the thorax, especially on the right side and shoulder, are easily seen. The patient says this has always been so.

The urine shows a trace of albumin; no casts; otherwise negative.

The blood: red corpuscles, 4,480,000; leukocytes, 5857; hæmoglobin, 75.

July 29th. Test breakfast shows good digestion and motor power; Congo positive; Günzberg negative. The patient was ordered Fowler's solution and dilute hydrochloric acid.

August 29th. Patient returns for examination, saying he feels better at times. He complains of pain in the right side. The tumor is still present, the boundaries being the same as in the previous examination. Leukocytes, 6366.

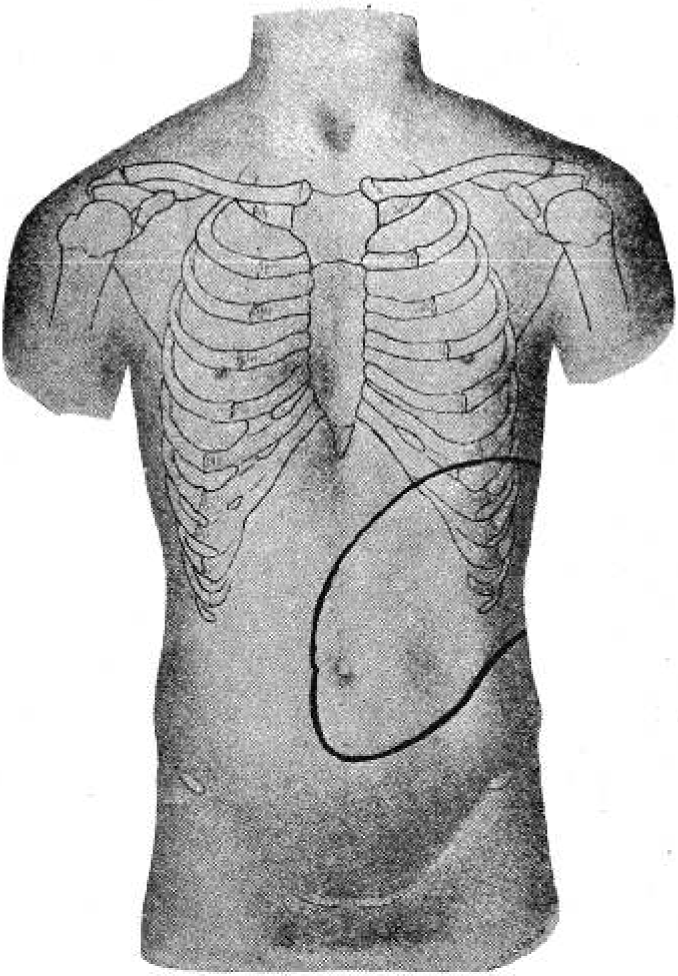
September 20th. The patient is still sallow and cachectic, the spleen slightly smaller than at the last examination.

Examination of the stained blood taken at the early visits had shown red corpuscles of fairly uniform size, a few normoblasts, no megaloblasts or myelocytes. Returning from my vacation, I examined, with great interest, the specimens that had been preserved. Finding nothing essentially different from what is noted above, I sent for the patient, found the history and physical condition accurately described, and made further examinations of the blood.

22d. Differential count (Dr. Dock). Small lymphocytes, 32 per cent.; large lymphocytes, 5 per cent.; large mononuclear and transitional, 6 per cent.; polymorphonuclear, 52 per cent.; eosinophiles, 4 per cent.; degenerates, 1 per cent.; normoblasts, 4 to 100 leukocytes. The red corpuscles vary considerably in size and shape, but there are no very large or very small cells. Many cells show vacuoles. There are no polychromatophiles. The normoblasts have the usual characters well marked. Only one shows irregular staining of the nucleus. The polymorphonuclear leukocytes show a good many large ones, with small, deeply-staining nuclei. The lymphocytes are mostly very small, the nuclei staining deeply and showing fragmentation. The eosinophile cells are all of normal appearance.

The general appearance of the blood resembled that often seen in pernicious anæmia at times of comparatively good health. Numerous examinations showed a total absence of megaloblasts and of Ehrlich's myelocytes, as well as of any other indication of bone-marrow disease. The diagnosis of leukæmia in the aleukæmic stage, such as the patient's wife had at one time, was ruled out, and as the result of a differential diagnosis not necessary to detail here, splenic anæmia was accepted. In view of the theory of Banti and of the operations based on it or a

FIG. 1.



CASE I.

similar theory, I advised an attempt at removal of the spleen, which, after some consideration, the patient accepted. The advice was given on October 2d, but as the patient wished to arrange his affairs before the operation, he was examined at long intervals in the next month. In this period there was an interesting change in the proportion of the various forms of leukocytes, as appears best from the following counts, which include all up to the last day:

29th. Hæmoglobin, 60; red blood corpuscles, 3,640,000; leukocytes, 2037; normoblasts, 1 per cent.; small lymphocytes, 22.5 per cent.; large lymphocytes, 3.6 per cent.; transitionals, 1.5 per cent.; polymorphonuclears, 60.1 per cent.; eosinophiles, 5 per cent.; degenerates, 7.3 per cent.

October 2d. Hæmoglobin, 70; red blood corpuscles, 4,288,000; leukocytes, 2546; normoblasts, 1 per cent.; small lymphocytes, 25 per cent.; large lymphocytes, 3 per cent.; transitionals, 3 per cent.; polymorphonuclears, 63 per cent.; eosinophiles, 3 per cent.

15th. Normoblasts, 1 per cent.; small lymphocytes, 15.5 per cent.; large lymphocytes, 5 per cent.; transitionals, 1 per cent.; polymorphonuclears, 75.5 per cent.; eosinophiles, 3 per cent.

November 1st. Hæmoglobin, 75; red blood corpuscles, 4,300,000; normoblasts, 0.9 per cent.; small lymphocytes, 18 per cent.; transitionals, 7.5 per cent.; polymorphonuclears, 78 per cent.; eosinophiles, 3.5 per cent.

3d. Normoblasts, 1.1 per cent.; small lymphocytes, 8.6 per cent.; large lymphocytes, 13.2 per cent.; polymorphonuclears, 76 per cent.; eosinophiles, 2.6 per cent.

4th. Leukocytes, 3056; normoblasts, 1 per cent.; small lymphocytes, 6 per cent.; large lymphocytes, 4.33 per cent.; transitionals, 2.66 per cent.; polymorphonuclears, 85.66 per cent.; eosinophiles, 1.33 per cent.

6th. During anæsthesia, leukocytes, 4909; small lymphocytes, 6 per cent.; large lymphocytes, 4 per cent.; transitionals, 4 per cent.; polymorphonuclears, 84.5 per cent.; eosinophiles, 1.5 per cent.

7th. Leukocytes, 18,080; normoblasts, 4 per cent.; large lymphocytes, 1.5 per cent.; transitionals, 4.6 per cent.; polymorphonuclears, 91.9 per cent.; degenerates, 1.9 per cent.

9th. Leukocytes, 21,000; normoblasts, 6 per cent.; large lymphocytes, 2.9 per cent.; transitionals, 4.6 per cent.; polymorphonuclears, 90.8 per cent.; degenerates, 1.4 per cent.

Not only were the small lymphocytes less numerous, but the most typical forms were even fewer than the figures indicated, because the small and large lymphocytes showed many intermediate forms. The nuclei stained less intensely, but clearly, resembling those of large lymphocytes. Degenerated leukocytes were usually numerous up to the time of operating, and were nearly all of the polymorphonuclear class. These cells, therefore, were more numerous than in the beginning of the observation, but showed an unusual tendency to break down. While they are largely artefacts as found in the preparations, the variable numbers are suggestive.

October 31st. Patient enters hospital. Appetite is good; general condition as before.

November 3d. The spleen extends from one and a half to two inches below the navel, in the middle and left parasternal lines. There is a palpable groove half an inch above the navel.

6th. The spleen was removed under ether anæsthesia by Dr. C. B. Nancrede. There was considerable distention of the intestines. The spleen had very few adhesions at the anterior surface, but there were many at the upper end. The upper end was unusually thick in proportion to the other dimensions, and this, with the adhesions and the great size of the vessels, made the removal unusually difficult. Slight symptoms of shock appeared as the vessels were being tied. The pulse and respiration were good all through, but perspiration became profuse just at the end. After the operation there was nausea, tympanites, frequent and small pulse; the mind was clear. The patient, who had before looked on the operation with calmness, became very anxious, and on November 9th, three days after the operation, became collapsed, with cold skin, sweating, pallor, small and soft pulse of 88 beats to the minute, and died on November 10th, at 3.30 P.M.

CASE II. *Intestinal hemorrhage with diarrhœa; ascites; splenomegaly; fibroid tumors of uterus; laparotomy; removal of fibroids; discovery of cirrhosis of liver at operation; death from hemorrhage from varicose vein in stomach; sclerosis and calcification of portal vein; fibrosis of spleen and liver (atrophic cirrhosis); hyperplasia of hæmolymph nodes.*—Mrs. M. S., aged fifty-three years, housewife, born in Michigan, was admitted to the Medical Clinic of the University Hospital October 7, 1902. She had entered the Surgical Clinic for treatment of hernia, but was referred to the Internal Clinic on account of ascites.

Family History. Mother died at age of fifty-eight years, of "consumption." Father died at seventy-two of "heart disease." Four brothers and four sisters are in good health. Habits and mode of life have been good.

Previous History. Patient had whooping-cough, measles, and mumps in childhood, with good recoveries. Menstruation began at fourteen, stopped for a year, and was regular after that, lasting about three to four days, without unusual symptoms. At thirteen had an attack of "dysentery," in which she passed much blood. At nineteen was married. Has never been pregnant. (No reason for this could be discovered. Syphilis seems positively excluded.) Menopause in fiftieth year.

Six years ago the patient had "dysentery," and was confined to bed for six weeks. She passed large amounts of blood with loose and watery stools. Since then she has had similar attacks at intervals. A week before admission had a slight diarrhœa without blood in the stools. After the attack six years ago the abdomen gradually became larger, and at that time Dr. H. A. Shurtleff, of Partello, Mich., discovered free fluid in the abdomen, by physical signs. Soon after that œdema of the legs and ankles came on, lasting for two months. It has recurred at intervals since then, but less severely. The umbilical hernia appeared after vomiting, three years ago, and has grown larger; the inguinal hernia came on after coughing, one and a half years ago.

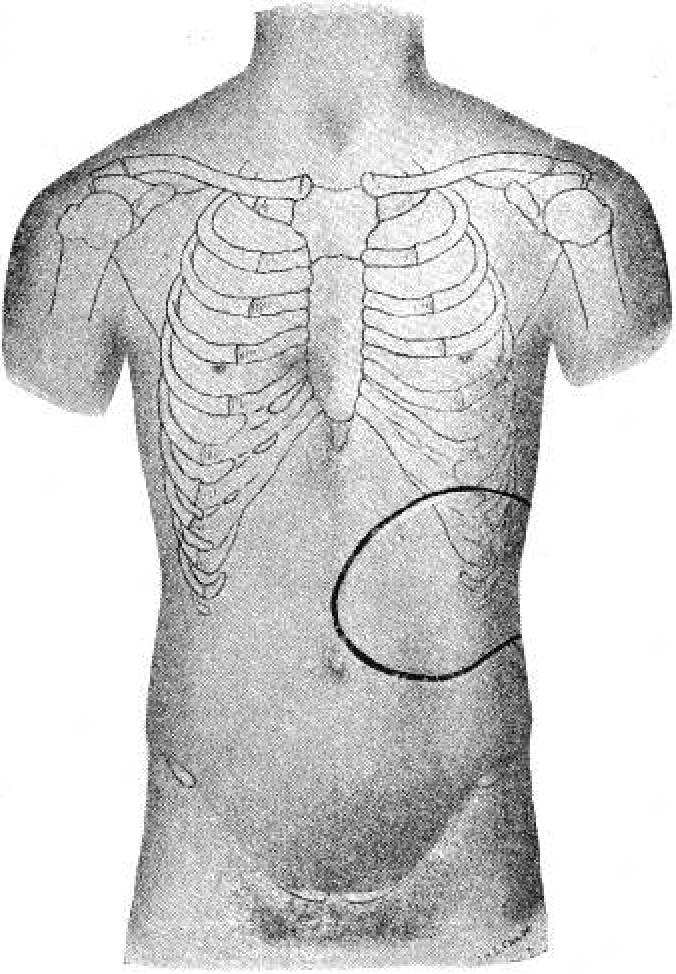
The patient now complains of constant soreness over the whole abdomen. She is constipated and has frequent desire to defecate, but bowels are moved with difficulty. Appetite fair, but patient eats sparingly on account of feeling of distention and sensation of weight in abdomen.

Status præsens, October 7, 1902. Medium height, slender frame; muscles small and soft; panniculus scanty; weighs 120 pounds; best weight, ten years ago, 150. The joints are normal, reflexes not altered, superficial lymphatic glands not enlarged.

The patient looks weak and cachectic, the expression is weary; mind clear.

The skin is pale, sallow, and inelastic; the visible mucous membrane pale; there is no œdema.

FIG. 2.



CASE II.

The teeth are artificial; the tongue is white-coated.

The thorax is broad, short, wide; epigastric angle wide and lower aperture of thorax distended. The expansion is fairly good, and symmetrical. The right lower lung border is on the sixth rib, the descent limited. Percussion of lung, front and back, negative. Auscultation reveals good vesicular murmur.

Heart. The apex-beat is indistinct, but can be felt in the fourth interspace, just inside the nipple line. There is a faint pulsation in the third left interspace. Cardiac dulness begins on the third rib, extends to within half an inch of the nipple line. Dulness under the sternum from the fourth rib down to the right of the sternum in the fifth interspace, one finger's breadth. The apex sounds are clear, the first accentuated. In the pulmonary area there is a short systolic murmur, followed by an accentuated second sound, lower than the aortic second. Radial pulse slightly tortuous, perhaps slightly thickened; rhythm regular, tension low.

The abdomen is enlarged, measuring thirty-seven inches at the umbilicus. It is bulging at the sides and flattened on top, with a prominence in the umbilical region. (During the examination this prominence subsided, leaving a slight depression in the same place.) The superficial abdominal veins are not enlarged. There are a few large venules over the anterior spines of the iliac bones. In the left side, above and below the iliac crest, some small veins are visible through the skin. On sitting up the protrusion reappears in the umbilical region, becoming larger than before. There is also a wide separation of the recti, permitting a great protrusion all the length of the abdomen. A large hernia also appears in the right inguinal region. The intestines can be plainly felt through the skin in the middle part.

Lying down, there is dulness on percussion in both flanks, almost to the nipple lines, and in front two inches above the pubes. The lines change quickly on change of position. Fluctuation is not distinct. Palpation of the lower abdomen is negative.

The liver dulness reaches to the margin of the ribs in the nipple line. Palpation is unsatisfactory on account of the distention.

Splenic dulness begins at the seventh rib, and is continuous with the dulness in the flank. The lower end can be felt about three inches below the edge of the rib.

Examination of the anus and rectum shows the small atrophic tags of old external hemorrhoids, and very small internal hemorrhoids, without evidence of hemorrhage. The mucosa shows a bleeding spot the size of a pinhead about six inches from the sphincter.

Examination of the pelvic organs (Dr. Peterson): negative.

Examination of urine: negative.

The blood flows freely; is thin; bright red. Red blood corpuscles, 2,800,000; leukocytes, 5857; hæmoglobin, 60 per cent. The differential count gave: small lymphocytes, 6 per cent.; large lymphocytes, 5.9 per cent.; large mononuclears and transitionals, 4.2 per cent.; polymorphonuclears, 81.7 per cent.; eosinophiles, 1.2 per cent.; degenerates, 0.6 per cent.; normoblasts, 3 per mille. The red corpuscles show very slight variation in size and shape.

October 21st. The superficial veins of the abdomen are slightly distended. Abdomen tapped in Monro's point and 3800 c.c. of fluid withdrawn. The fluid is clear, reddish-yellow; specific gravity, 1012. It contains a slight increase of red blood corpuscles. Differential count of the other cells: small lymphocytes, 53 per cent.; large lymphocytes, 8 per cent.; polymorphonuclears, 6 per cent.; large mononuclears, 33 per cent. The large mononuclear cells have the appearance of young endothelial cells; the lymphocytes partly that of endothelial cells, partly that of ordinary lymphocytes.

After tapping, the abdomen measures thirty-two and three-quarter inches at the umbilicus. The spleen can be easily felt three fingers' breadth below the ribs, and reaching to the median line. Liver dulness not quite to edge of ribs. Liver cannot be felt.

22d. Patient has been more comfortable since the tapping. There is gaseous distention in the right side. The spleen reaches the navel line in the nipple line and the middle line, four fingers' breadth above the umbilicus. The surface of the spleen is smooth, flat; the edge thick; there is a notch above the lower end, on the inner side.

24th. The abdomen is larger; thirty-four and a half inches. Signs of free fluid not so extensive as before the tapping. The ankles are slightly œdematous. The superficial abdominal veins are not enlarged. No murmur in the epigastric region.

Blood. Red corpuscles, 4,266,666; leukocytes, 7894; hæmoglobin, 70 per cent. Differential count: small lymphocytes, 3.4 per cent.; large lymphocytes, 6.4 per cent.; transitionals, 11.4 per cent.; polymorphonuclears, 77 per cent.; eosinophiles, 1 per cent.; degenerates, 0.8 per cent. No nucleated red cells found; a few poikilocytes.

30th. The patient has complained much of pain and soreness in the pelvis, which could not be explained by any of the manipulations practised upon her. Another consultation was held with Dr. Peterson, and an examination made under ether. A small, hard mass was found in front of the uterus, apparently a fibroid tumor.

Up to this time the diagnosis had not been sufficiently clear to offer a surgical operation to the patient, who was convinced that medicines would not relieve her. Cirrhosis of the liver, most likely at first glance, was made doubtful on account of the history, the long duration of ascites without more venous enlargement, and the relatively large spleen. A Talma operation did not seem warranted. A late stage of Banti's disease seemed ruled out also by the long duration of the ascites and relatively good condition of the blood. On the other hand, I presented the patient both in clinic and before the Medical Society as a possible case of late Banti, with a complication, perhaps in the pelvis, causing chronic peritonitis, and with the blood picture (polymorphonuclears increased relatively) obscured by the local conditions in the abdomen. Here, too, surgical intervention did not seem more promising than it did on the theory of cirrhosis, because if the case were one of Banti's it was probably past the aid of surgery; and my surgical colleague declined to explore in order to determine that point. Tuberculosis and malignant disease of the peritoneum were ruled out by the long duration and the character of the fluid, as well as other features not necessary to point out. Chronic peritonitis due to an undiscovered disease in the pelvis was a diagnosis I took up several times to explain the ascites as an associated phenomenon with the enlarged spleen, but up to the discovery of the fibroid this diagnosis did not lead to an exploration.

Although the fibroid could not be correlated with the enlarged spleen, or even the ascites, save as an exceptional condition, it gave us something to operate for, and so meet the pressing wishes of the patient as well as our own desires for an exploration. Accordingly, Dr. Peterson operated November 7th. A large amount of fluid having the same character as that previously examined escaped from the incision. An irregular, roundish tumor, one and a half inches in diameter, was found adherent to the lower and anterior part of the uterus. It proved to be a calcified fibromyoma. The uterus was very small, the fundus round and of stony hardness. It was found to be merely a shell around another calcified fibroid, and was removed. There was no distinct disease of the tubes and ovaries, but there were many adhesions around all the pelvic organs. The omentum was fastened low down by adhesions. The spleen was large, the lower surface uneven. The liver was also uneven to the touch, though as seen by light thrown into the abdominal cavity it showed only slight granular change. There were numerous adhesions around the liver and spleen.

The wound healed well at first, but left a small sinus. The ascites gradually returned, and on December 2 five litres of fluid were removed. Specific gravity, 1012.

December 6th. The patient returned to the medical ward. *Status præsens:* The patient looks tired and sleepy, and complains of feeling sick all over. She has had diarrhœa, with great pain. The stools were dark and watery, and contained fresh blood. The abdomen measures thirty-four inches. The abdominal veins are distinct, but not swollen. Palpation of the abdomen causes pain. The wall is soft in general. There is a flattened mass just above the navel line and two inches to the left of the navel, apparently adherent to the deep tissues. The spleen extends not quite two fingers' breadth below the ribs in the nipple line, three fingers' breadth in the parasternal line. There is a soft, blowing, systolic murmur over the base of the heart. A few crackling râles can be heard in the right axilla.

There had been leukocytosis ever since the operation, from 10,000 to 18,000 per cm., with increased percentage of polymorphonuclear cells and many degenerates.

Red blood corpuscles, 3,040,000; leukocytes, 17,200; hæmoglobin, 40 per cent. Differential count: small lymphocytes, 12.2 per cent.; large lymphocytes, 2.2 per cent.; transitionals, 1.1 per cent.; polymorphonuclear, 84 per cent.; eosinophiles, 0.45 per cent. No nucleated reds. Moderate poikilocytosis.

At 1.45 P.M. the patient vomited half a pint of blood, and twenty minutes later a similar quantity. The blood is bright red, alkaline; contains large clots. At 6.30 P.M. patient vomited about six ounces of bloody fluid. Pulse small and irregular. Patient feels weak, dizzy, and nauseated.

7th. Patient feels better. Has not vomited, but passed bloody fluid per rectum.

8th. Patient is weaker and in great pain. Retention of urine.

9th. Still passing bloody fluid per rectum. Cannot swallow.

10th. Incontinence of rectum.

11th. Died at 12.05 P.M.

PART II. PATHOLOGY (DR. WARTHIN).

CASE I.—Mr. I. A., aged forty-one years, American. Died November 10, 1899, at 3.30 P.M. Autopsy by Dr. Warthin, 7.30 P.M., November 10, 1899.

Autopsy Protocol. Body of average height and build. No anomalies or deformities. No signs of trauma. In the left hypochondrium there is a recent laparotomy wound, extending from the edge of the ribs to within three fingers' breadth above the iliac crest. It is covered with surgical dressings. On removing these the edges of the wound are found to be separated and a fold of intestine protruding. Edges of the wound are discolored (gray to black), but present no evidences of pus. Abdomen distended above the level of the ribs.

The skin is pale, sallow; there is slight hypostasis posteriorly; small boil on right forearm; teeth artificial; hair is negative. The panniculus is greatly decreased; no œdema; muscles are small and emaciated; rigor mortis is present throughout. The extremities are cold. There are no signs of decomposition.

Brain and *spinal cord* not examined. (No permission.)

Diaphragm at the fourth rib on the right; fifth rib on the left.

Position of thoracic organs is normal. Apex of heart in fourth intercostal space, just inside of the nipple line. The mediastinum is rich in fat; no enlarged glands. The thymus fat is in large amount, and in it there is found a pinkish lobulated body 3 cm. long by 1 cm. in diameter. There is no fluid in the pleural cavity. Both pleuræ are free; there are no adhesions.

The *pericardium* is lax; contains a very small amount of clear fluid. Subepicardial fat is slightly increased.

Heart weighs 320 grams; is about the size of cadaver's right fist. The auricles contain ante-mortem white clots; the ventricles are filled with fluid blood and currant-jelly clot. The heart muscle is firm, brownish-red; papillary muscles are prominent. The left ventricle wall measures 15 to 20 mm. in thickness. The endocardium is slightly thickened. The pulmonary, tricuspid, and aortic orifices and valves are normal. The mitral orifice is rather small; does not admit two fingers. Mitral flaps are slightly thickened and shortened. Coronary vessels are negative.

Right lung weighs 272 grams; *left lung* weighs 336 grams. Both lungs are partly collapsed. Pleuræ negative. Slight anthracosis. On section the parenchyma of lungs is grayish-pink; lower lobes slightly hypostatic; no airless areas; very slight exudate on pressure; bronchi are empty; mucosa pale; pulmonary vessels negative; bronchial glands moderately pigmented; on section negative. A number of enlarged glands along the thoracic aorta. On section they are red and spleen-like. The great vessels of the thorax and the thoracic duct are negative.

Mouth and *neck organs* were not examined.

Abdomen. The omentum is rolled up, greatly thickened, and moderately injected, and is adherent to the diaphragm and anterior abdominal wall in the splenic region, and to the peritoneal surface of the ileum by fresh fibrinous exudate. In the region of the spleen there is a large mass of fresh fibrinous adhesions, but no evidence of hemorrhage. Spleen (see below) is absent, having been removed at operation. Ligatures on stumps of splenic vessels are in position. Splenic vessel filled with fresh red thrombi.

The small intestine is greatly distended throughout. The serosa is cloudy, moderately injected, and everywhere covered with a fine fibrinous deposit. Many of the coils are adherent by coarser strings of fibrin, the adhesions being easily separated. The lower sixteen inches of the ileum lie in the left side of the abdomen, a portion of the ileum projecting through the laparotomy wound. Coils of the ileum are adherent to each other by fibrinous exudate, the adhesions being firmer in neighborhood of wound. They are also adherent to the large intestine by a similar fresh fibrinous exudate. About two and a half inches above the cæcum there are several (six) dark patches in the intestinal serosa, covered with greenish-gray fibrin. These patches are irregular, not triangular in shape, and do not extend entirely around the bowel; some reach about two-thirds of the way. From the serosa these patches extend some little distance into the fat of the mesentery, which shows a superficial necrosis corresponding to the patches of fibrin. These areas have the appearance of having been cauterized; they are all on the upper surface of the mesentery.

The *stomach* is greatly distended, its wall very thin. It lies pressed against the anterior abdominal wall, and was cut during the median incision, letting out a large quantity of sour-smelling gas under high pressure. It contains about 500 c.c. of brown, bile-stained, sour fluid. The mucosa of the stomach shows slight post-mortem change. Veins of stomach wall are greatly distended. The large venous branches in the greater curvature contain fresh thrombi. Around the gastro-epiploica sinistra there is a ligature which includes the serosa of the stomach wall, but not the muscle coats. The coronary veins are greatly dilated, as are also the anastomoses with the œsophageal veins.

The *duodenum* is greatly distended with gas; it contains a small amount of grayish, slimy material. Its mucosa is injected and somewhat swollen. Bile passages are patent.

The *ascending* and *transverse colon* and *cæcum* are greatly distended as far as the splenic flexure, the descending colon being more moderately distended. They contain a small amount of formed feces and a large amount of grayish mucus. The sigmoid flexure and the descending colon are unusually pale and nearly white. The *appendix* is long and narrow, extends into the pelvis; no adhesions about it.

Liver weighs 1280 grams, measures 23 x 15½ x 8 cm.; is small; left lobe very atrophic; right lobe shows posteriorly a number of small anomalous lobules. Capsule is thickened, especially near the ligaments. Veins of capsule congested. Small cavernous angioma, size of a pea, on the upper surface of the right lobe. On section the blood-content is found to be fairly rich. In one of the larger branches of the portal there is a fresh but firm red thrombus. The cut surface of the organ is granular, in some areas markedly so; the granules slightly elevated. The largest granules are paler in color than the remainder of the liver parenchyma, which is of a pale-brown color. Outlines of the lobules are distinct over the greater part of the cut surface; they are smaller than normal. The peripheral zone of the lobules is more grayish, cloudy, and apparently swollen. The connective tissue is apparently increased. In some areas the tissue of Glisson's capsule is thickened, hyaline, and scar-like. In about the middle of the right lobe there is an area about 5 cm. in diameter, which is firmer and lighter in color than the other portions of the cut surface, and is slightly elevated and more distinctly granular. In this area the connective tissue seems to be increased to a greater extent, and the lobules are larger than elsewhere.

The *gall-bladder* is distended, containing about 200 c.c. of dark-brown fluid and three grayish cholesterin stones of small size. Its mucosa is very thin, the wall much stretched.

The *portal vein* is extremely distended, and is filled with a fresh but firm mixed clot. The lumen of the vein at its beginning, just above the union of the splenic and superior mesenteric veins, is irregularly narrowed and partly bridged off by fibrous, valve-like constrictions, which contain calcareous plates. The vein is divided by these fibrous bands into several sac-like spaces, the walls of all these showing calcification. The tortuous lumen barely admits the tip of a lead-pencil or large probe. The stenosis involves the mouth of the splenic vein, almost completely occluding it. The splenic and superior mesenteric veins back of the stenosis are enormously distended and filled with a soft red thrombus, which is continuous with the firmer mixed thrombus filling the portal. In the media of the portal vein at the point of constriction there are thin plates of calcification. The walls of the splenic and mesentery veins are greatly thickened, and present scattered patches of hyalin.

The *pancreas* is of normal size; on section apparently normal, save for congestion and small areas of hemorrhage. The splenic vein and its pancreatic branches are greatly distended, and are filled with firm red thrombi. In the neighborhood of the pancreas there are several glands resembling accessory spleens. They possess very thick capsules.

In the root of the mesentery, particularly near the portion of ileum showing the dark fibrin patches, the lymph glands are slightly enlarged and hyperæmic. Hyperæmic patches are scattered over the surface of the mesentery, in some cases grayish-black; these are covered with fibrinous exudate.

The *retroperitoneal lymph glands* are not enlarged, but are red, firm, and spleen-like. Abdominal aorta, iliacs, etc., negative.

Ureters negative.

Bladder empty, collapsed; mucosa pale.

Adrenals show post-mortem softening of medullary portion.

Kidneys. The fatty capsule of both kidneys is moderately rich in fat; the fibrous capsule strips easily and is not thickened. The right kidney measures 9½ x 5 x 3½ cm., and weighs 128 grams. The left kidney measures 10½ x 4½ x 3 cm., and weighs 112 grams. The surfaces of both kidneys are bright red, and the venæ stellatæ well marked. On section both kidneys are bright red. Cortex of each measures ½ to ¾ cm. Outlines between labyrinths and medullary rays not well defined; glomeruli not visible; consistence firm; bloodvessels engorged; pelvis of left kidney somewhat dilated, that of right negative.

Ureters and *bladder* negative.

Genitals. External genitals negative. Testicles and epididymis negative. Prostate and seminal vesicles not examined.

Aorta, iliacs, iliac veins, femorals, and *vena cava* negative.

Bones. Negative. Right tibia, fourth lumbar vertebra, and several ribs removed. Tibia split longitudinally. Slight hyperplasia of red marrow. Small lymphoid areas throughout the fatty marrow; the largest of these, in the middle of the tibia, measures ½ x ¼ cm.

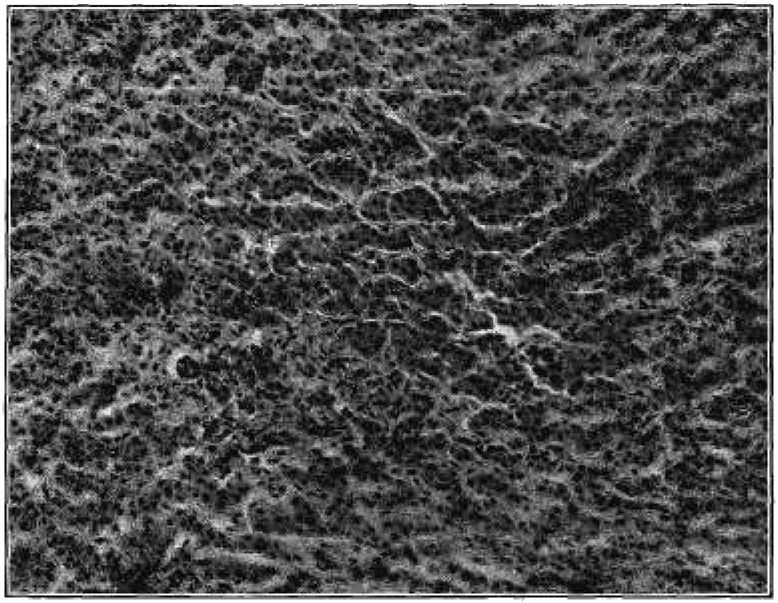
Peripheral Glands, Nerves, and Vessels. Negative. (Material was taken from all parts and organs of the body, fixed in Flemming's solution, Müller's, mercuric chloride, alcohol and formalin, and embedded in celloidin and paraffin, and stained by ordinary and special staining methods.)

Microscopic. Heart. Sections show atrophy of heart muscle and slight increase of connective tissue.

Lungs. Sections taken from different portions show a number of small recent and old hemorrhagic infarcts. Many of the alveolar walls are thickened, and there is an increase of connective tissue about the larger vessels. In the lower lobes there is slight emphysema. The bloodvessels are congested, and many of the smaller arteries show sclerotic changes. A few organizing thrombi are found. Anthracosis is moderate. There is a slight œdema. In the capillaries there are found numerous emboli of bone-marrow giant cells, similar to those found in the spleen and liver. These are so numerous that three to six may be found in one field. In the small arterioles the protoplasm of the giant cell is preserved, in the capillaries only the deeply-staining knobbed and lobulated nuclei are visible. A few multinuclear giant cells are found in the arterioles.

Liver. In the sections taken from all parts of the liver, with the exception of the elevated area in the middle of the right lobe, the lobules are atrophic, the atrophy involving chiefly the central portions of the lobules. The central veins and capillaries are dilated, while the liver cells of the central zone are atrophic or in part necrotic, or show varying stages of fatty degeneration, cloudy swelling, and necrosis. In some lobules the liver cells of the central zone have completely disappeared. In the majority of lobules there is an endothelial or fibroblastic proliferation in the capillaries of the central zone. This is most marked in those areas showing the most pronounced atrophy or necrosis of the liver cells. The liver rods present a more decided radiating appearance than usual, and in many places appear as if elongated by pressure. The periportal islands of connective tissue are relatively increased in number, the connective tissue in the majority being of a hyaline char-

FIG. 3.



Liver of Case I. Intralobular increase of connective tissue. Early stage of diffuse interstitial hepatitis. Hyperplasia of intralobular reticulum. × 175.

acter and presenting no infiltration. The fine reticulum of the lobules is everywhere increased, but particularly in the areas of most marked atrophy, where it replaces in part the liver cells. In many areas it is very cellular and presents an endothelial or fibroblastic proliferation. With Van Gieson's stain the greater part of the newly formed reticulum stains a light red. By the same stain heavier lines and strands of connective tissue may be seen in places extending into the lobule. Small focal necroses are found scattered throughout the sections; the necrotic areas showing the same endothelial or fibroblastic hyperplasia as seen in the central part of the lobules. Hypertrophic liver cells are also found throughout the lobules. The central veins and branches of the hepatic veins are greatly dilated and their walls thickened. Giant cells are found in the capillaries; they resemble bone-marrow giant cells and are similar to those found in the lungs and spleen, but are not nearly so numerous as in those organs. In many sections the only changes are those of a chronic passive congestion.

Sections taken from the yellowish, elevated area in the middle of the right lobe show that the liver-lobules are larger and the liver cells are increased in size, the blood capillaries being nearly obliterated. Many of the liver-cell nuclei are very large and stain deeply. In Glisson's capsule there is a marked small-celled infiltration and proliferation of the connective tissue and the smaller bile-ducts. The periportal connective tissue is somewhat increased and the finer reticulum of the lobule likewise shows an increase. The central congestion and atrophy are less marked in this portion.

The liver as a whole presents the picture of a chronic passive congestion and atrophy of the central portion of the lobule, with an increase of the reticulum of the lobules, chiefly central, but also periportal. This increase is in many places due to a fibroblastic proliferation. In some areas these changes are so marked as to warrant their interpretation as a beginning stage of cirrhosis, in part central and in part periportal.

Portal Vein. Sections of the wall show sclerotic changes and calcification, involving chiefly the media. No evidence of recent phlebitis. Branches of portal show similar conditions. Fresh thrombi in all branches.

Stomach and intestines present the picture of a chronic passive congestion with atrophy and chronic catarrhal inflammation.

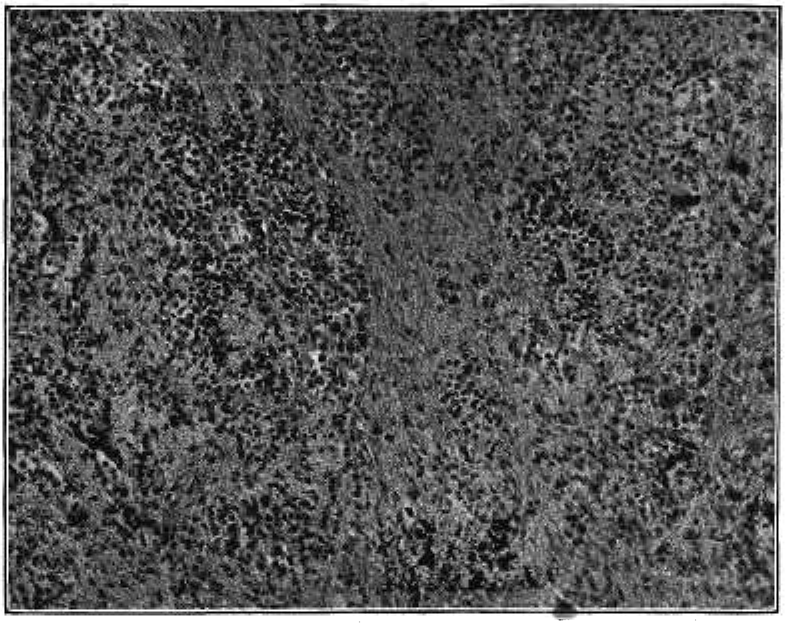
Pancreas shows decrease in size of lobules and a moderate fatty infiltration. Near the middle of the body of organ a small adenoma the size of a pea was found. This consists of tubules lined with simple columnar cells, the majority showing mucoid degeneration. Pancreatic veins greatly dilated, and walls thickened.

Omentum. Congested and œdematous, and showing a marked small-celled infiltration and fibroblastic proliferation, hemorrhage, etc. Surface covered with a fibrinous exudate.

Mesentery. Peritoneal surface shows patches of fibrin. Very slight small-celled infiltration near surface. The necrosed patches on upper surface correspond to small areas of anæmic necrosis caused by the thrombosis of small mesenteric vessels. Mesenteric veins greatly dilated and sclerotic. Throughout the root of the mesentery are small calcareous nodules surrounded by areas of lymphoid cells. Other collections of lymphoid cells surround small concentric hyaline masses; others surround small arterioles showing hyaline thickening of the intima, sometimes arranged in concentric laminæ. As all stages of transition can be found between the calcareous and hyaline nodules and the hyaline vessels with proliferating endothelium, it seems probable that the former represent a latter stage of the process. The cells surrounding the masses are of the character of lymphocytes, they lie in a fine reticulum containing small bloodvessels, and some contain typical germ-centres. They are, therefore, regarded as representing newly formed lymphoid tissue. Similar formations are found throughout the retroperitoneal fat.

Mesenteric Glands. Atrophic, and contain hyaline areas, some of which show calcification. Vessels congested. Stroma increased. Few germ-centres seen. Numerous phagocytes in sinuses.

FIG. 4.

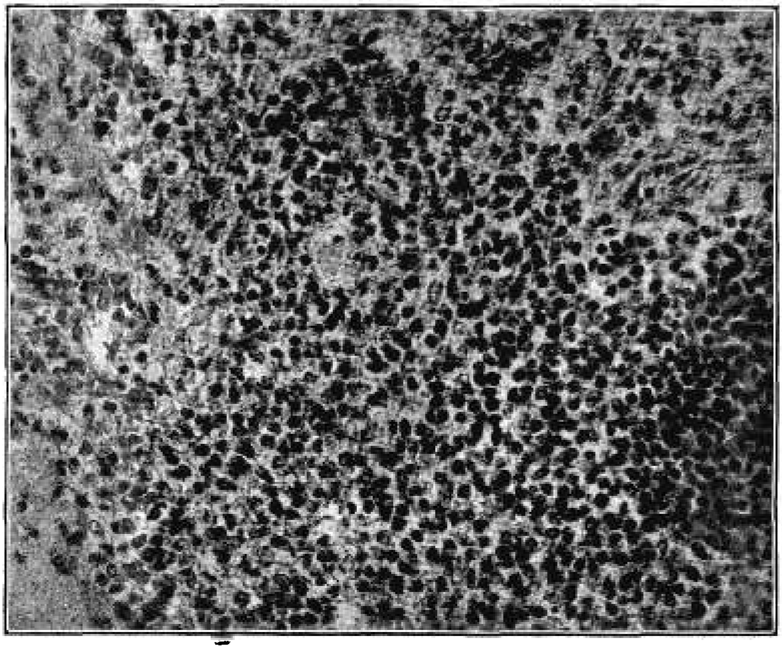


Spleen of Case I. Area showing advanced fibrous hyperplasia of reticulum of pulp. × 175.

Kidneys. Somewhat contracted, the number of glomeruli in a field being greatly increased. Many hyaline and calcified glomeruli are found, as well as numerous cystic ones. Connective-tissue stroma increased in areas. Many of the tubules contain hyaline casts. Bloodvessels congested. No giant cells found in kidney capillaries.

Retroperitoneal Glands. The red spleen-like glands on section are hæmolymph nodes, closely corresponding in structure to that of the normal spleen, and are of the type known as hæmal glands, possessing no lymph vessels or sinuses. They are surrounded by a very thick capsule from which trabeculæ containing unstriped muscle run into the gland. No definite blood sinuses are present; the greater part of the gland structure consists of a pulp-like reticulum and blood spaces lined by endothelium. Lymphoid cells lie in the meshes of the reticulum. Small scattered collections of lymphoid cells suggest follicles or germ centres, but these lack the true vascular relations of splenic follicles. The blood spaces are filled with blood, and occasionally bone-marrow giant cells are found. An unusual number of pigment-containing phagocytes are present in the larger blood spaces. With Mallory's reticulum stain the reticulum appears as a rather coarse, deeply-blue network enclosing spaces filled with blood. The resemblance to normal spleen is so close that the glands no doubt would be classed as accessory spleens. They resemble very closely the spleen-like hæmolymph glands of the hog. The ordinary lymphatic glands of this region are atrophic, present a great increase of reticulum, with atrophy of lymphoid tissue and almost complete absence of germ-centres. The lymph sinuses are filled with endothelial cells, many of which contain blood pigment. Cords of newly formed lymphoid tissue corresponding to those in the mesentery lie throughout the retroperitoneal fat. The hæmolymph nodes that contain both blood and lymphatic systems do not show the spleen-like hyperplasia seen in the pure hæmal glands.

FIG. 5.



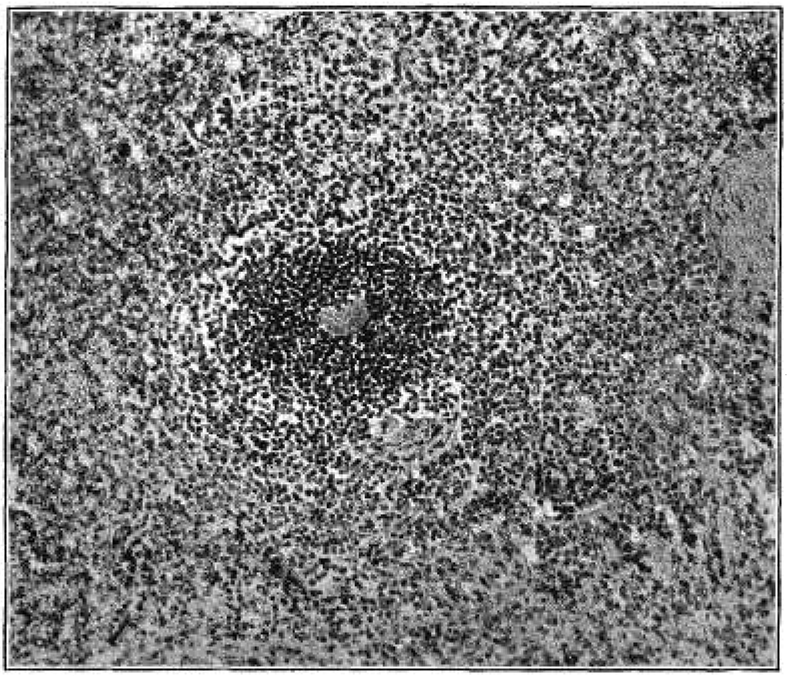
Spleen of Case I. Area showing early stage of endothelial and fibrous hyperplasia. × 175.

Mediastinal and Cervical Glands. These are atrophic, congested, and are more or less anthracosed.

Bone-marrow. The red marrow is of a lymphoid type, contains an increased number of normoblasts, and very few giant cells. Numerous phagocytes containing blood pigment are present.

Spleen. (Removed at operation by Dr. Nancrede, November 6, 1899.) Nearly a perfect oval in shape. It measures 23 x 13 x 9 cm., and weighs 1536 grams. Its capsule is greatly thickened and covered with fine stringy adhesions which are more numerous in the region of the hilum. The enlargement of the organ is most marked in the upper two-thirds, the thickness diminishing below. On the anterior margin there are two notches at the lower third, the lower one of these extending almost through the lower part of the organ and forming a shelf-like depression. In the hilum there is a small accessory spleen. On section the spleen bleeds freely. The pulp is a pale red and of firm consistence. The stroma is greatly increased. Splenic follicles cannot be seen. On exposure to the air no Charcot-Leyden crystals were formed on the surface.

FIG. 6.



Spleen of Case I. Diffuse fibrous and endothelial hyperplasia of pulp. Hyaline mass in follicle. × 175.

The organ was received warm from the surgeon's hands. Portions were fixed at once in Flemming's solution, Müller's, mercuric chloride, alcohol, and formalin.

Microscopic. The capsule is greatly thickened, consisting of a rather dense hyaline connective tissue. It is covered with partially or wholly organized deposits of fibrin. The trabeculæ are thickened to a less extent and are much farther apart than normally. The lymphoid tissue of the pulp is scanty, the pulp being replaced largely by a dense fibrous network enclosing the enlarged blood spaces. These are lined and in many cases partly filled by large endothelial or reticular cells having one or more lightly staining nuclei, and in the majority of cases nucleoli. The fibrous tissue represents a hyperplasia of the reticulum of the pulp, the endothelial cells lining the blood spaces apparently taking part in the formation of the new fibrous tissue. In many places, particularly beneath the capsule, it is more dense and hyaline, and the blood spaces are smaller. In the denser areas the fibrous tissue stains deep red with Van Gieson's. In such areas the lymphocytes are very scanty and the endothelial cells are not so numerous. In other portions of the pulp the fibrous tissue is less dense, more cellular, stains lighter with Van Gieson's, and presents a more fibroblastic character. In such areas the blood spaces are much enlarged and the number of lymphocytes and endothelial cells much greater. The latter are found not only in the spaces, but also between the fibrillæ of the new connective tissue. Occasional giant cells resembling those of the bone-marrow are found in the blood spaces; they are similar to those found in the lungs and liver, and are probably to be regarded as emboli. There is no evidence of their origin *in situ*. Occasional nucleated red blood cells are found in the blood of the pulp spaces, but neither the ordinary stains nor the triacid stain, etc., show any peculiar cells, myelocytes, or other bone-marrow elements to be present. In the neighborhood of the trabeculæ there are found occasional small collections of densely packed lymphoid cells resembling follicles. A thickened hyaline arteriole may be seen in the central portion of some of these collections of cells; others surround small hyaline masses. The bloodvessels of the organ are very prominent, being greatly dilated and showing marked thickening of the walls. Small deposits of blood pigment (hæmosiderin) are found about some of the trabeculæ, and throughout the pulp spaces occasional endothelial phagocytes containing pigment are seen.

The study of many sections taken from different parts of the spleen leads to the conclusion that the conditions here represent a chronic passive congestion, with great enlargement of the pulp spaces, a coincident or secondary fibrous hyperplasia of the pulp reticulum dependent upon or associated with a hyperplasia of the reticular or endothelial cells lining the spaces. In connection with these changes there is a secondary atrophy of the lymphoid tissue of the pulp and of the follicles. As a result of such atrophy and destruction of the splenic parenchyma the splenic function of hæmolysis is gradually lost. The spleen-like hyperplasia of the hæmal glands, the new formation of lymphoid tissue throughout the root of the mesentery, and the retroperitoneal fat are regarded as compensatory in character.

SUMMARY OF PATHOLOGY. The most striking feature of the case is the marked fibrous hyperplasia of the spleen. That this cannot be secondary to the liver condition is shown by the marked differences in degree and character of the hepatic and splenic conditions respectively. The splenic condition is, without doubt, much the older condition, as seen by the greater abundance of the fibrous tissue, its greater density and more hyaline character, and its difference in reaction in areas to Van Gieson's stain; moreover, the atrophic condition of the splenic parenchyma is more marked than that of the liver. The process in the liver is interpreted as a chronic passive congestion and atrophy, followed, secondarily, by an increase of the finer reticulum of the lobules. In several areas, notably in the middle of the right lobe, there is also a beginning periportal increase of connective tissue with hyperplasia of the smaller bile-ducts. This beginning hyperplasia may be regarded as a very early stage or beginning of a cirrhosis, and is evidently of much more recent occurrence than the splenic condition.

In explanation of the congestion and fibrosis of the spleen, the stenosis and calcification of the portal vein may be regarded as an etiological factor. That the changes in the wall of the vein at the junction of the splenic and superior mesenteric veins represent an old and not a recent process is shown by the hyaline thickening of the wall and of the fibrous septa and the plates of calcification. These changes must be taken as evidences of an old thrombosis and pylephlebitis, with subsequent organization, contraction, stenosis, and calcification. It is possible that the stasis in the splenic vein and the damming back of the blood upon the spleen have caused the atrophy and the progressive fibrosis seen in that organ. On the other hand, it is also possible that the splenic condition is primary, and the condition of the portal vein may be purely coincidental or may result from a toxic condition of the blood in the splenic vein dependent upon the disturbed splenic function, or upon a general intoxication, or one affecting the portal area primarily. The changes in the hæmolymph nodes and the new formation of lymphoid tissue are regarded as compensatory for the lost splenic function. It is also probable that a similar compensation is present in the bone-marrow, as shown by the changes described above. The anæmia may be regarded as due either to an excessive destruction of red blood cells by the endothelial phagocytes of the portions of the spleen still exercising the function of hæmolysis, in connection with an excessive activity of endothelial phagocytes in the hæmolymph nodes and bone-marrow, or to a toxic hæmolysis, or to a disturbance of balance between the destruction of hæmoglobin and the elaboration of the products resulting from such destruction. From a careful study of the case we have arrived at the following:

PATHOLOGICAL DIAGNOSIS. Fibrosis of the spleen (*splenomegaly*), with beginning fibrosis of liver (*early stage of Banti's disease*); stenosis and calcification of portal vein, with extreme passive congestion of radicles of portal, particularly of splenic vein; chronic passive congestion of gastrointestinal tract, lungs, etc.; compensatory hyperplasia of hæmolymph nodes and new formation of lymphoid tissue in retroperitoneal fat; increase of lymphoid marrow; acute fibrinous peritonitis following splenectomy; embolism of bone-marrow giant cells; general sclerosis and atrophy; secondary anæmia; cholelithiasis.

Case II.—Mrs. S., aged fifty years, American, died 12.05 P.M., December 11, 1902. Autopsy by Dr. Warthin at 1.30 P.M., December 11, 1902.

Autopsy Protocol. Cadaver of slender build; no anomalies; no deformities. Right inguinal hernia. Abdomen on level of ribs. In the median line, between the umbilicus and pubes, there is a laparotomy scar 14 cm. long, which is entirely healed with the exception of a sinus about 1 cm. long at about the middle of the scar. Pus exudes from the opening, which communicates by a fistulous tract with an abscess cavity in the abdominal wall.

Skin is pale, hair negative, teeth artificial. Over the back there is pale hypostasis. Transfusion punctures in pectoral regions. The muscles are greatly emaciated; on section they are deep brown and dry. There is no rigor mortis. The panniculus is of a fair amount. Œdema is present over both ankles. Body heat is present.

Brain and spinal cord not examined.

The diaphragm is at the third intercostal space on both sides.

Mammæ atrophic. In the adipose tissue of the right there is a firm swelling about the size of a walnut, consisting of hyperæmic and œdematous fat tissue (transfusion area).

Apex of heart is behind the fourth rib, half-way between the left parasternal and nipple lines. The *mediastinal fat* is abundant and of an orange color; contains no enlarged glands. In the *thymus region* there is an abundance of orange-colored fat. No remains of thymus.

No fluid in *pleural cavities*. The left lung is adherent throughout, the adhesions being very dense over the base, where they have to be cut. Right lung is adherent by easily torn adhesions at apex and over the posterior surface and at the base; the adhesions here not so firm as on left side.

The *pericardial sac* is not tense; contains no fluid. Surfaces of pericardium are moist and shining.

The heart is much smaller than cadaver's right fist; weighs 272 grams, and measures 13 x 9.5 x 5 cm. There is a small, irregular, tendinous spot on the posterior wall of left ventricle; another near the apex, and one on the anterior wall of right ventricle. The subepicardial fat is increased. Heart muscle is pale brown, fairly firm. The right auricle contains currant-jelly and mixed clots and plum-colored fluid blood. The wall of the right ventricle measures 5 mm., 3 mm. of which are of fat. Right ventricle is empty. The left ventricle is empty, wall contracted; measures 20 mm. The left auricle contains plum-colored fluid blood and small red jelly clots.

The *mitral valve* barely admits two fingers. Circumference of orifice, 8 cm. Flaps are thickened along proximal edges. Tricuspid barely admits three fingers; orifice measures 11 cm.; flaps negative. Pulmonary barely admits thumb; orifice measures 6.5 cm.; flaps negative; aortic admits thumb easily; orifice 7 cm. in circumference; slight thickening of central segment.

The *aorta* shows beginning sclerosis, most marked about the coronary orifices. The descending branch of the left coronary artery is moderately sclerosed.

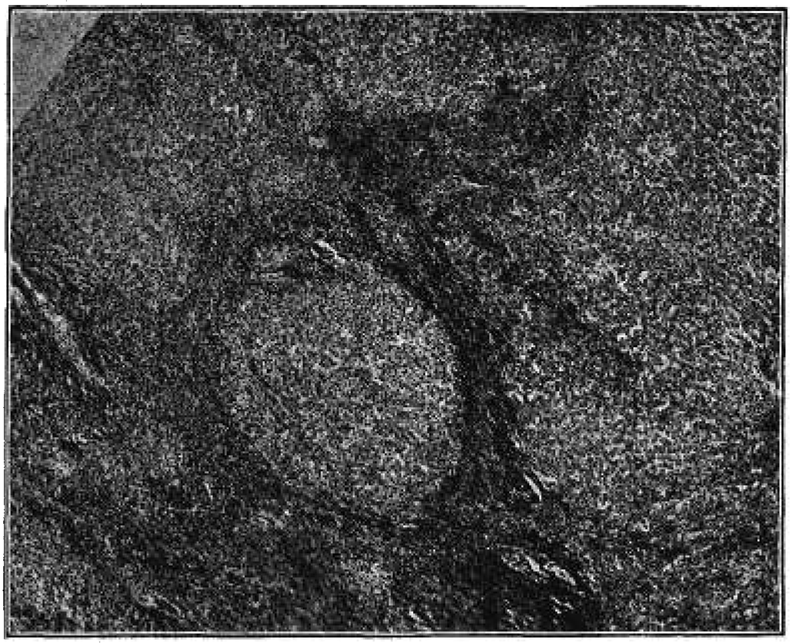
The *left lung* weighs 216 grams, and measures 17 x 13 x 3 cm. It is collapsed, pale, moderately anthracosed, and the pleura is covered with the remains of adhesions. On section the lung is pale, dry, almost bloodless, and yields almost no fluid on pressure. Beneath the pleura, particularly over the lower lobe, there are scattered a few dark areas of small size, which are firm on pressure.

The right lung is more voluminous and contains more air than the left. It weighs 256 grams, and measures 19 x 12 x 4 cm. On section it is more pink and moist over the middle and lower lobes; otherwise similar.

Bronchi negative. Bronchial glands moderately anthracosed. Pulmonary vessels contain large ante-mortem mixed clots and post-mortem jelly clots.

Thoracic aorta measures 5 cm. in circumference; contains small jelly and mixed clots. The azygos veins are greatly dilated.

FIG. 7.



Low-power view of liver of Case II., showing picture of advanced cirrhosis. × 45.

Thoracic duct is distended with clear fluid.

Thoracic portion of œsophagus contains a brownish fluid. The lower third shows marked varices; the œsophageal veins and their anastomoses with the coronary veins of the stomach are markedly dilated. There are no evidences of hemorrhage from the œsophageal mucosa. No erosions of the varices.

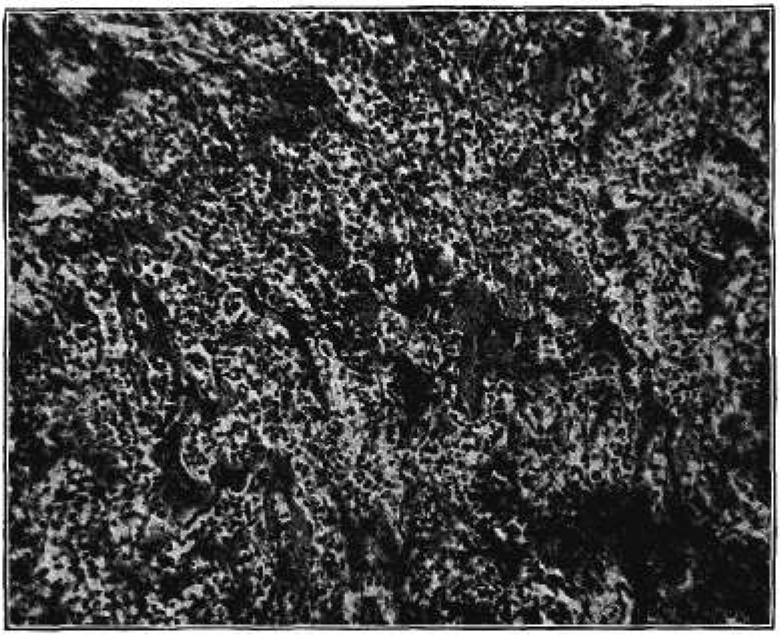
Mouth, pharynx, and *larynx* not examined. The cervical portion of the œsophagus contains a brownish fluid. The thyroid is small and of firm consistence. On section it is pale and more brown than normal.

Cervical Hæmolymph Nodes. In the deep cervical tissues numerous reddish, spleen-like glands resembling hæmolymph glands are found. They are larger and appear much more numerous than normally.

Cervical vessels and nerves negative.

Abdomen. The *omentum* is adherent to the abdominal wall in the neighborhood of the umbilicus by easily torn adhesions, between which there is a fibrinopurulent exudate. The lower border is adherent to the anterior abdominal wall just above the pubes. The intestinal coils present scattered fresh fibrinous adhesions, particularly on the left side. From between the adhesions one and a half litres of turbid fluid containing many fibrin flakes are obtained, the greater part being taken from the left side below the spleen. The adhesions are strongest in the neighborhood of the incision. In the abdominal wall at this point there is a fistulous tract extending through the rectus muscle as far as the pubes, and communicating with the external opening in the laparotomy wound. Between the adhesions there is a collection of pus. The intestines in this region are firmly adherent to each other and to the abdominal wall. In one of the loops there is a darkened, thin, and softened area, but no perforation. The pelvis is filled with coils of small intestine which are adherent to the sigmoid and rectum. Between these adhesions there are about 50 c.c. of fluid similar to that in the abdominal cavity, but more turbid, and containing more fibrin. The transverse colon and cæcum are moderately distended; the former is S-shaped, the lowest part two fingers' breadth above the umbilicus. The *liver* is high and very small, the lower edge in the right parasternal line being three finger breadths above the edge of ribs and just at the tip

FIG. 8.

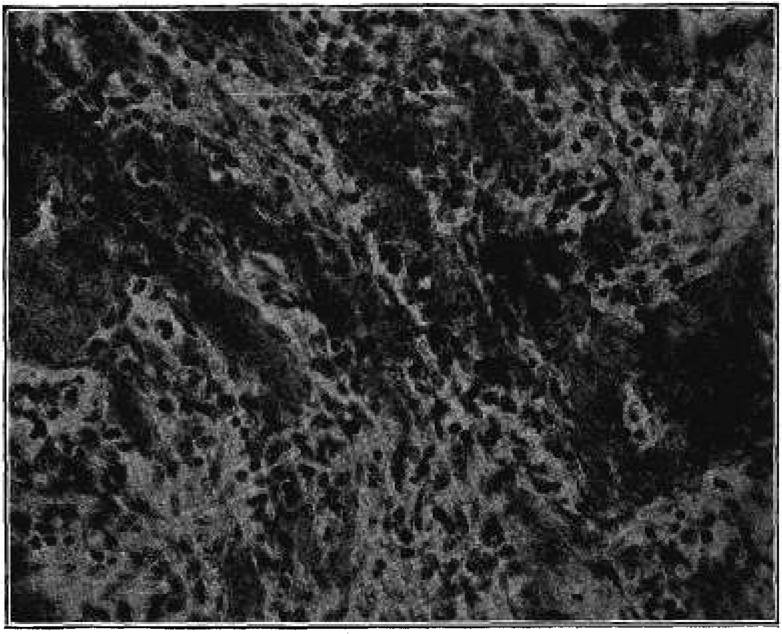


Spleen of Case II. Fibrous hyperplasia of reticulum, with hyaline change. Dark areas = hyaline area stained deep red with Van Gieson's. No follicles. × 175.

of the ensiform in the median line. The left border is two fingers' breadth to the left of the left sternal line. The *spleen* is greatly enlarged, filling in the entire left hypochondrium and projecting a hand's breadth below the edge of the ribs. It is adherent to the diaphragm by several easily torn adhesions. The lower border of the stomach is three fingers' breadth below the ensiform. There are easily torn adhesions between the stomach, omentum, and hilum of spleen. No accessory spleen found in gastrosplenic omentum.

Spleen weighs 944 grams, and measures 19 x 14 x 7 cm. It is triangular in shape, broader at upper pole, the enlargement involving chiefly the upper third. The upper pole is slightly recurved. There is one deep notch at about the middle of the anterior border, extending nearly halfway across the organ. The capsule is thickened, particularly along the anterior margin, where there are flattened hyaline thickenings and the remains of stringy adhesions. The organ flattens somewhat, but is of increased consistence. On section it is firm and tough, creaks to the knife, pale, grayish-blue red, almost homogeneous, and shining, semitranslucent, but slightly granular in areas. Contains but little blood. The follicles are greatly diminished in number and in size—only a few can be seen. There is a diffuse fibroid hyperplasia of the reticulum of the pulp. The vessels at the hilum appear normal; veins collapsed.

FIG. 9.



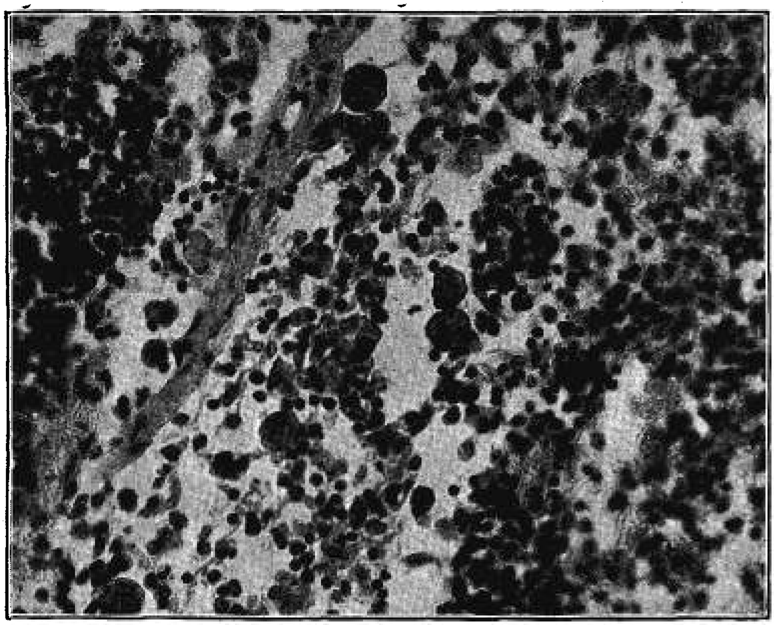
Spleen of Case II. Higher power view of Fig. 8. Fibrous hyperplasia of splenic reticulum, with hyaline change. Dark areas = hyaline areas staining deep red with Van Gieson's. × 350.

Adrenals well preserved; no pathological changes.

Left Kidney. Fatty capsule very rich in fat. Fibrous capsule strips easily; shape about normal; less plump than the right one; weighs 120 grams; measures 10 x 6 x 3 cm. Small, yellowish areas on the posterior surface. These are neither elevated nor depressed. On section they are found to extend through the cortex and medullary pyramids. In other respects resembles right kidney.

Right Kidney. Fatty capsule very rich in fat. Fibrous capsule strips easily. Surface of kidney smooth, mottled brownish-red and yellow; weighs 104 grams; measures 8½ x 5½ x 3 cm. Several yellowish spots, size of a pea, seen over the surface. On section cut surface is pale brownish-red, containing small yellowish areas size of a pepper-corn, and is more translucent than normal. Cortex measures 2 to 3 mm. Outlines of labyrinths and medullary rays well preserved. Vessels anæmic; consistence firm; subpelvic fat increased; pelvis negative.

FIG. 10.



Portion of a sinus of retroperitoneal hæmolymph node from Case II. Large phagocytes filled with red blood cells, the outlines of the latter being just visible. Free blood cells in meshes of blood sinus. × 175.

Ureters negative.

Bladder distended with cloudy urine. Mucosa negative.

Duodenum contains plum-colored, bloody fluid, with strong odor of H_2S. In this fluid are four large currant-jelly clots, weighing 12.2, 10.8, 7.3, and 6.1 grams respectively. Mucosa anæmic, and presents no erosions or evidences of hemorrhage.

Bile Passages. Patent.

Small Intestine. The jejunum and ileum contain fluid similar to that found in duodenum, with yellowish clots. Toward the lower end of the ileum the fluid becomes thicker and darker in color. The mucosa is very anæmic. No evidences of hemorrhage.

Appendix. Firm adhesions containing pus about the appendix. Lumen negative.

Large Intestine. Entirely filled with tar-like material. About the middle of transverse colon there is a small polyp. Mucosa is very anæmic. No evidences of hemorrhage. The *rectum* is filled with a black, tarry, tenacious material adhering to the mucosa. In the latter are the scars of healed ulcers. No evidences of hemorrhage. Hemorrhoidal veins greatly enlarged, but collapsed. No evidences of hemorrhage from these.

Stomach. Contains 750 c.c. of a thick, black fluid, composed chiefly of red blood cells and a few small red clots. The mucosa is thickened and covered with a thick, brownish mucus. About 14 cm. below the cardiac orifice there is in the posterior wall an erosion in the mucosa, having undermined edges, and about 3 mm. in diameter. Beneath this and under the neighboring mucosa there is a space about 2 cm. in diameter, filled with a fresh blood clot, and communicating with a ruptured vein in the posterior wall, a greatly dilated branch of the coronary veins. This is undoubtedly the source of the hemorrhage. All of the veins of the stomach wall are greatly dilated and tortuous, but are for the chief part collapsed and empty. The coronary veins in particular show a marked dilatation.

Liver. Small, about size of a child's head, nearly round, but irregular. Weighs 1856 grams; its greatest dimensions are 23 x 17 x 11 cm. It is adherent to the diaphragm by very firm and tough adhesions. The surface is very irregular and nodular, particularly along the lower edge and near the ligaments. It contains numerous small hyaline areas and small, translucent, glistening, brownish points, varying in size from that of a pinpoint to that of a pinhead. These are most numerous along the lower edge. Over the upper surface of the organ the capsule is 0.5 cm. thick, and firmly adherent to the diaphragm. The consistence is very firm; creaks on cutting. On section Glisson's capsule is greatly thickened in areas, the cut surface being mottled whitish and brown, the white areas corresponding to the dense hyaline connective tissue of the thickened Glisson's capsule. The increase of Glisson's capsule is, however, very irregular, being most marked in the central portion of the right lobe and beneath the external capsule. There appears to be a diffuse increase of connective tissue throughout the organ. The cut surface is slightly granular, the liver tissue showing as irregular islands surrounded by connective tissue. Surface is more translucent than normal. The outlines of the lobules cannot be made out. The branches of the hepatic vein are dilated, those of the portal nearly obliterated by the periportal increase of connective tissue. No icterus.

Gall-bladder is very small; size of a pigeon's egg. It is retracted above the edge of the liver. Tissues of the wall are thickened. It contains a very thick, glairy, brownish-like bile; no stones.

Portal Vein. Just above the junction of the splenic and superior mesenteric veins the wall of the portal vein is thickened and contains calcareous plates. The lumen is stenosed, barely admitting tip of lead-pencil. The wall is irregularly thickened and shows lines of contraction radiating from the areas of calcification. The lumen is filled with a recent mixed thrombus, chiefly white, firm in consistency, and extending to the portal of the liver and into the smaller portal branches within the liver. No evidences of organization of the thrombus. All the radicles of the portal are enlarged and show thickenend walls, the splenic vein in particular.

Pancreas. Smaller than normal. Lobules atrophic. Fatty infiltration between the lobules. Throughout the organ there are numerous whitish areas of fat-necrosis in the interlobular fat. These are most marked along the upper border. In the great omentum about a hand's breadth below the greater curvature there is a red body the size of a cherry, embedded in the omental fat. It is rather soft and fluctuating, resembling a congested hæmolymph node. On section it shows a small, firm, whitish nodule resembling epithelial tissue and suggesting pancreatic tissue, the remaining portion being made up of reddish, lymphoid tissue and a small abscess cavity containing a brownish, pus-like material. Small areas of fat-necrosis are found in the fat-tissue near by.

Mesentery. Mesenteric glands not enlarged. No hæmolymph nodes found except in root, where there is a great number of reddish and bluish glands embedded in the mesenteric fat, probably hæmolymph nodes.

Retroperitoneal Glands. Over 250 red, spleen-like glands found in the root of mesentery, retroperitoneal fat, about the renal vessels, behind and along the great abdominal vessels, and particularly along the brim of the pelvis. Along the left common iliac there is one 4 cm. long and as thick as a lead-pencil. A similar cord lies along the vena cava. The majority of the red glands are the size of a bean; others vary in size from that of a pinhead to that of a bean. On section they are firm, bluish-red, and spleen-like; only a few show dilated sinuses and a softer consistence.

External Genitals. Negative.

Uterus and Appendages. Absent. (Removed at operation.)

Site of operation covered with fibrinopurulent exudate. About 50 c.c. of turbid fluid in pelvis.

Bone-marrow. Tibias, opened longitudinally, show no lymphoid changes. Red marrow in sternum and ribs hyperplastic.

Peripheral Lymph Glands. Prominent, but not enlarged.

Peripheral Bloodvessels. Femoral veins filled with recent thrombi; the left completely occluded by a clot of firmer consistency than that found in the right femoral. Lumbar and azygos veins greatly enlarged. (Material taken from all organs and tissues fixed in Flemming's, Müller's, Zenker's, mercuric chloride, alcohol, and formalin. Embedded in paraffin; stained in ordinary and specific stains.)

Microscopic Examination. Heart. Sections of heart muscle show brown atrophy. Fatty infiltration of right ventricle.

Lungs. Sections show atrophy and sclerosis of bloodvessels. Great numbers of bone-marrow giant cells in capillaries.

Spleen. Marked fibrosis of the reticulum of the pulp, with hyaline change of the newly formed connective tissue, the blood spaces being outlined by hyaline cords of varying thickness. The process is fairly uniform throughout the entire organ, although denser and more hyaline areas, with wholly or partially obliterated blood spaces, are seen in portions, particularly near the external capsule. The blood spaces are very prominent, and many greatly enlarged, some areas being cavernous.

The lymphoid tissue of the pulp is very atrophic, and only small, scattered collections of cells resembling follicles are seen. The majority of these contain hyaline masses. The blood spaces are lined by large, hypertrophic, endothelial cells, but these do not show any evidences of hyperplasia into the spaces. A few giant cells resembling those of the bone-marrow seen in the blood spaces (embolism?); a few normoblasts are also found. No unusual forms of cells observed in sections stained by special methods (triacid, polychrome, methylene blue, etc.). All the bloodvessels of the spleen are enlarged and show marked sclerotic changes and numerous nodules of calcification. A deposit of lime-salts is also found in some of the hyaline masses of the follicles. Testing of many sections for iron with potassium ferrocyanide and hydrochloric acid entirely negative. No phagocytes containing blood pigment seen, and no free blood pigment.

Liver. Sections taken from different parts of the liver show that the greater part of the organ presents the picture of an atrophic cirrhosis. Glisson's capsule is greatly increased, and there is also a growth of connective tissue into the lobule. The periportal increase of connective tissue is, however, very irregular; in some areas it is very marked, in others it is but slight, small areas showing no cirrhotic changes. In other areas there is a central increase of connective tissue. The greater part of the lobules show central dilatation of the capillaries and atrophy of liver cells. Much of the connective tissue, particularly toward the surface of the organ, is hyaline and scar-like; in those areas showing less change the new tissue has more of a fibroblastic character and contains more small cells. There is a slight increase of the small bile-ducts. Liver cells are atrophic; those of the central portion of the lobule contain a very small amount of hæmatoidin. Iron test is entirely negative.

Pancreas. Sections show a fatty atrophy. Vessels are sclerosed. There is a small-celled infiltration of the interlobular fat, and localized areas of fat necrosis with small hemorrhages are present.

Body from Omentum. Sections show the red body found in the omentum to consist of three separate structures: A hæmolymph node showing great numbers of phagocytes containing red cells in its blood sinuses; an accessory pancreas containing all the characteristics of pancreatic tissue, acini, and areas of Langerhans. There is an increase of the stroma of the parenchymatous portion as well as of the islands, and an infiltration of fat-cells. No large duct leading from this accessory pancreas can be found, but a small duct can be traced leading into the third structure of the mass—an abscess cavity filled with a pus-like material, and having a wall of granulation tissue in which there are many large, thin-walled vessels. Small groups of necrosed fat-cells are found in the neighboring tissue.

Stomach and Intestine. Sections show a chronic passive congestion with catarrhal inflammation.

Kidneys. Sections show atrophy, sclerosis of vessels, and localized areas of interstitial inflammation. Convoluted tubules show moderate cloudy swelling. Iron test wholly negative.

Hæmolymph Nodes. These constitute one of the most interesting features of the case, judged from the pathological standpoint. The changes may be summed up as follows: All the red glands examined show the structure of hæmolymph nodes in varying stages of hyperplasia. They contain but few germ-centres. The blood sinuses are all very prominent and large, but the majority are only partly filled with blood. In some glands the sinuses are distended. They contain also great numbers of large hyaline cells having a yellowish or brownish color, and staining deep red with eosin. Some of the sinuses are completely filled with these cells. With the higher powers these cells are found to be phagocytes completely filled with red cells, or with the products of the disintegration of red cells. The nucleus of the phagocytic cell is usually pushed to one side, and shows more or less karyorrhexis. The outlines of the red cells can be distinctly seen in the phagocytes, and in many cases appear unchanged. In other phagocytes only hyaline droplets staining deeply with eosin or a brownish pigment are seen. The majority of the cells give a strong iron reaction with ferrocyanide and hydrochloric acid. In some there is a yellowish pigment which does not respond to the iron test (hæmatoidin ?). Great numbers of mononuclear eosinophiles are found in some of the glands. Normoblasts and giant cells resembling those of the bone-marrow are found in large numbers in the blood sinuses. With the triacid stain numerous cells resembling myelocytes (neutrophile granulation and large excentric nuclei) are also found in the blood sinuses. In many of the retroperitoneal hæmolymph nodes there are also large masses of hyalin which occupy the lymphoid areas between the blood sinuses. Many of these show calcification. Encapsulated caseous tubercle found in one gland. In the sections treated with ferrocyanide and hydrochloric acid the areas of calcification give a marked iron reaction, which is diffuse or very finely granular. A similar reaction is observed in many of the hyaline areas in which calcification has not taken place. The appearances suggest some connection between the hyaline masses and the blood destruction.

Lymphatic Glands. Atrophic; show marked hyaline change.

Bone-marrow. The normoblasts are increased, and the giant cells greatly diminished in number. The reticulum of the red marrow appears hyperplastic and the blood spaces smaller. In the blood spaces and in the reticulum are great numbers of pigmented phagocytes, as in the hæmolymph nodes. Free pigment is also present. The iron test shows the pigment to be hæmosiderin.

Tumor of Uterus (removed at operation). The tumor was found to be nearly completely calcified. After decalcification of portions sections were obtained showing it to be a myofibroma, with increase of the connective tissue, atrophy of the muscle, hyaline change, and calcification. Traces of atrophic muscle found throughout the dense hyaline tissue between the masses of calcification. Very few nuclei found in the hyaline connective tissue.

SUMMARY OF PATHOLOGY. The immediate cause of death is the anæmia resulting from the hemorrhage from the eroded varix in the stomach wall. The dilatation of the stomach and splenic veins is the result of the portal obstruction. For the latter two etiological factors are present, the stenosis and calcification of the portal vein and the periportal cirrhosis. It is impossible to decide the relative part played by these factors. The most important question is the relation of the splenic condition to that of the liver. It is, however, impossible to decide positively which is the primary condition, the splenic fibrosis or the cirrhosis of the liver. Because of the more advanced stage of the splenic fibrosis, the dense hyaline character of the new tissue formed in the walls of the pulp spaces, the areas of hyaline and calcification, the greater atrophy of splenic parenchyma, etc., it seems very probable that the splenic process is older than that of the liver. If this is the case the question also arises here as to the relationship between the changes in the spleen and those in the portal vein. Is the splenic fibrosis primary, or is it secondary to the disturbance of the splenic circulation following thrombosis and the resulting stenosis of the portal? This question, unfortunately, cannot be positively answered. The portal condition is, undoubtedly, the result of an old pylephlebitis and thrombosis, but it is impossible to determine if it preceded the splenic condition or is secondary to some toxic condition of the portal blood, dependent, possibly, upon a primary change in the spleen or upon a general toxæmia.

The changes in the hæmolymph nodes are to be interpreted as compensatory for the lost splenic function. The complete absence of blood pigment or of phagocytes in the spleen may explain the great excess of hæmolysis occurring in the hæmolymph nodes and bone-marrow. The evidences of phagocytic hæmolysis in the hæmolymph nodes presented by this case show a much greater blood destruction than that occurring in these glands in any of the cases of pernicious anæmia observed by the writer. In spite of so great a hæmolysis no hæmosiderin is found outside of these glands and the bone-marrow. Iron tests of liver, spleen, and kidneys do not show a trace of iron. The hæmolysis is therefore different from that occurring in pernicious anæmia, and is most probably not a *toxic hæmolysis,* but is to be interpreted as a *compensatory* one. The anæmia may then be explained as due to an excess of hæmolymphatic hæmolysis over that of the normal splenic hæmolysis, or to a disturbance in the elaboration of the products of blood destruction.

There is no histological evidence of a destruction of red cells in the general circulation, as is the case in pernicious anæmia.

From the study of the case we have arrived at the following:

PATHOLOGICAL DIAGNOSIS. Splenic fibrosis with cirrhosis of the liver (late stage of Banti's disease), gastric hemorrhage, anæmia, stenosis, and calcification of portal vein, chronic passive congestion of portal system, ascites, peritonitis, hyperplasia of hæmolymph nodes with excessive hæmolysis, hyperplasia of red marrow, giant-cell embolism, general atrophy and sclerosis, tuberculosis of retroperitoneal gland, accessory pancreas, fat-necrosis.

COMPARISON OF CASES. Both cases present the following common features:

1. Splenic fibrosis.
2. Hepatic fibrosis.
3. Stenosis and calcification of portal vein.
4. Chronic passive congestion of portal system.

5. Sclerosis of vessels, particularly of portal area.

6. A marked tendency to hyaline change and calcification throughout portal area.

7. Hyperplasia of hæmolymph nodes and bone-marrow and new formation of lymphoid tissue in retroperitoneal fat.

8. Secondary anæmia.

Comparing the two cases the splenic fibrosis in Case I. represents an earlier stage; that in Case II. a much more advanced stage. In Case I. the liver changes are relatively slight, a beginning fibrosis. In Case II. they are marked—an advanced cirrhosis, a cirrhosis, however, which does not present all the features of an ordinary atrophic cirrhosis. The changes in the portal vein in both cases were at the same site and of about the same degree. In Case I. the more irregular character of the vessel wall, the bridging strands of tissue across the lumen of the vein, might indicate a more recent process. The chronic passive congestion of the portal is more marked in Case II. than in Case I., as shown by the greater development of anastomoses and the pronounced varices in œsophagus and stomach leading to the fatal hemorrhage in the former case.

In Case I. the hyperplasia of the hæmolymph nodes is not nearly so marked, and in these glands there are not the evidences of the pronounced hæmolysis seen in Case II. In Case I. the spleen contains some phagocytes and blood pigment. In Case II. none of these were found in the spleen. These differences may also be interpreted as indicating an early stage of the process in Case I. and a later stage in Case II. The pathological findings, therefore, would appear to warrant the diagnosis of early and late stages of Banti's disease.

In both of these cases (unlike some others described under the head of splenic anæmia or Banti's disease) there is no clinical evidence and no positive anatomical proof of the existence of syphilis. On the contrary, the clinical history gave strong arguments against the possibility of this disease.

The important question as to the relationship between the splenic condition and the stenosis of the portal remains to be settled. Is the splenic fibrosis a distinct pathological entity or is it a secondary process? The changes in the spleens of the two cases do not represent any features that could not be explained by a chronic passive congestion of marked degree; that is, it is possible for such a hyperplasia of connective tissue to follow a severe and long-continued passive congestion, as is sometimes the case in the lung, liver, etc. This question, however, cannot be answered by these two cases. It can only be said that there is a possibility that the clinical picture of splenic anæmia or Banti's disease may be caused by a stenosis of the portal vein due to old phlebitis and thrombosis and the resulting stenosis.

On turning to the cases of splenic anæmia reported in the literature under such heading, we find that the condition of the portal vein is not mentioned at all, or so briefly as to convey the impression that the vessel had not been carefully examined. In the older literature there is, however, a *number of very suggestive cases similar to the two described* above, and reported under the head of "Thrombosis," or "Stenosis of Portal Vein, with Hypertrophy of the Spleen." The descriptions given of these cases, though incomplete and meagre, when judged from modern standpoints of diagnosis, suggest very closely the cases now described as splenic anæmia. Among these is one reported by Sir Andrew Clark (*Trans. London Path. Soc.*, 1867). The patient had suffered previously from "biliousness" and intestinal hemorrhages; died of gastric hemorrhage. Skin sallow, body very fat. Autopsy showed spleen to be three times normal size; liver "thinner" than normal; wall of portal vein contained calcareous plates; in the lumen there was a fresh thrombus.

It is possible that this and some of the similar cases reported in the literature, as well as some of the cases of cirrhosis with changes in the portal vein, may represent the same morbid processes as do our two cases and that they should be placed in the category of splenic anæmia.

CONCLUSION. The two cases reported above present, clinically and anatomically, the pictures of an early and a late stage of Banti's disease—an older fibrosis of the spleen with a more recent fibrosis of the liver. Both cases present also the condition of stenosis and calcification of the portal vein. Is the latter the primary condition, to which the splenic fibrosis follows secondarily, or is it the result of a portal or general intoxication, to which the splenic and hepatic fibrosis are also due? The solution of this problem must wait upon the observation and investigation of other similar cases. The two reported above, however, may be taken as further evidence in favor of the view that the symptom-complex of splenic anæmia represents a group of varying pathological conditions, the splenic condition being secondary.

DESQUAMATION OF THE SKIN IN TYPHOID FEVER.*

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DESQUAMATION of the skin of a pronounced character is rare in typhoid fever, and is mentioned by but few of the systematic writers

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